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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,677	07/20/2006	Masaaki Takegami	4633-0174PUS1	8077

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EXAMINER	
RUBY, TRAVIS C	

ART UNIT	PAPER NUMBER
4184	

NOTIFICATION DATE	DELIVERY MODE
02/23/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/586,677	TAKEGAMI ET AL.	
	Examiner	Art Unit	
	TRAVIS RUBY	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/20/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The disclosure is objected to because of the following informalities:

Page 4 Paragraph 14 Line 4 misspelling, change “cooing” to --cooling--.

Page 21 Paragraph 77 Line 12 change "Figure 6" to --Figure 7-- to reflect the labels in the drawings.

Page 21 Paragraph 77 Line 14 change "Figure 7" to --Figure 6-- to reflect the labels in the drawings and reorder the list of figures in Paragraph 77 so that the numbers are in order.

Appropriate correction is required.

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Refrigerating Apparatus with Independently Controlled Subcooler.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3, 9-14, and 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Howard (US6557361B1).

Howard teaches:

Re Claim 1. A refrigerating apparatus (Figure 1) comprising:

a refrigerant circuit which includes a utilization side heat exchanger (ref 80) and a heat source side compressor (ref 50) and through which refrigerant is circulated to effect a vapor compression refrigeration cycle (column 4 lines 12-25); and

a cooling fluid circuit which includes a supercool heat exchanger (ref 40) and a pump mechanism (ref 10) which delivers cooling fluid to the supercool heat exchanger, wherein refrigerant which is supplied to the utilization side heat exchanger is supercooled by cooling fluid in the supercool heat exchanger (ref 40) (column 3 lines 1-5, 29-47),

the refrigerating apparatus further comprising control means (ref 90) which reduces the power consumption of the pump mechanism either based on the state of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger or based on the state of cooling fluid of the cooling fluid circuit and the temperature of outside air (column 4 lines 26-37 teaches that the power consumed by the compressor is sensed. Column 1 line 65 - Column 2 line 13 teaches that the power sensed is used to calculate and execute a more efficient operating condition. Column 6 lines 55-57 teach that the compressor can be manipulated by reducing the speed of the compressor to make the system more efficient and thus reduce power consumption).

Re Claim 2. The refrigerating apparatus of claim 1, wherein:

the control means (ref 90) is configured to estimate power consumption relating to the refrigerant circuit either based on the state of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger or based on the state of cooling fluid of the cooling fluid circuit and the temperature of outside air, whereby the power consumption of the pump mechanism is reduced (column 4 lines 26-37 teaches that the pressure is sensed at two points of the system.

The two points are before and after the compressor which also means that the sensors are before and after the supercool heat exchanger. The pressure would be an indicator of the state of refrigerant of the cooling fluid. Column 4 lines 38-44 teach that the measured state of refrigerant would be used to control the system and reduce power, therefore making the system more efficient.).

Re Claim 3. The refrigerating apparatus of claim 1, wherein:

the cooling fluid circuit is a supercool refrigerant circuit which includes a supercool compressor as a pump mechanism (ref 10) and a heat source side heat exchanger (ref 40) and through which supercool refrigerant as cooling fluid is circulated to effect a vapor compression refrigeration cycle (column 3 lines 1-5, 29-47), and

the control means (ref 90) is configured to reduce the power consumption of the supercool compressor (ref 10) by lowering the operating frequency of the supercool compressor either based on the state of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger or based on the state of supercool refrigerant of the supercool refrigerant circuit and the temperature of outside air (column 4 lines 26-37 teaches that the power consumed by the compressor is sensed. Column 1 line 65 - Column 2 line 13 teaches that the power sensed is used to calculate and execute a more efficient operating condition. Column 6 lines 55-57 teach that the compressor can be manipulated by changing the speed of the compressor to make the system more efficient and thus reduce power consumption).

Re Claim 9. The refrigerating apparatus of claim 1 or claim 2, wherein:

the cooling fluid circuit is a supercool refrigerant circuit which includes a supercool compressor as a pump mechanism and a heat source side heat exchanger and through which supercool refrigerant as cooling fluid is circulated to effect a vapor compression refrigeration cycle (column 3 lines 1-5, 29-47), and

the state of supercool refrigerant of the supercool refrigerant circuit is the high pressure of supercool refrigerant in the supercool refrigerant circuit (column 4 lines 26-32).

Re Claim 10. The refrigerating apparatus of claim 1 or claim 2, wherein:

the cooling fluid circuit is a supercool refrigerant circuit which includes a supercool compressor as a pump mechanism and a heat source side heat exchanger and through which supercool refrigerant as cooling fluid is circulated to effect a vapor compression refrigeration cycle (column 3 lines 1-5, 29-47), and

the state of supercool refrigerant of the supercool refrigerant circuit is the pressure difference between the high pressure and the low pressure of supercool refrigerant in the supercool refrigerant circuit (column 4 lines 26-32).

Re Claim 11. A refrigerating apparatus (Figure 1) comprising:

a refrigerant circuit which includes a utilization side heat exchanger (ref 80) and a heat source side compressor (ref 50) and through which refrigerant is circulated to effect a vapor compression refrigeration cycle (column 4 lines 12-25); and

a cooling fluid circuit which includes a supercool heat exchanger (ref 40) and a pump mechanism (ref 10) which delivers cooling fluid to the supercool heat exchanger, wherein

refrigerant which is supplied to the utilization side heat exchanger is supercooled by cooling fluid in the supercool heat exchanger (ref 40) (column 3 lines 1-5, 29-47),

the refrigerant apparatus further comprising control means which controls power consumption relating to the refrigerant circuit and power consumption relating to the cooling fluid circuit (column 4 lines 26-37 teaches that the power consumed by each compressor is sensed. Column 1 line 65 - Column 2 line 13 teaches that the power sensed is used to calculate and execute a more efficient operating condition. Column 6 lines 55-57 teach that the compressor can be manipulated by reducing the speed of the compressor to make the system more efficient and thus reduce power consumption), and

the control means increasing the power consumption of the cooling fluid circuit in preference to the refrigerant circuit, when there is an increase in load (column 4 lines 38-57, column 2 lines 45-51 teaches adjusting the loads of each circuit. It is inherent that since the reference teaches a controller and adjusting the loads of each circuit that you would be able to adjust one circuit more than the other).

Re Claim 12. The refrigerating apparatus of claim 11, wherein:

the control means is configured to control power consumption relating to the cooling fluid circuit so that the temperature of refrigerant at an outlet of the supercool heat exchanger becomes a target value, and to set the target value based on the ambient condition of the supercool heat exchanger so that the power consumption of the cooling fluid circuit is preferentially increased when there is an increase in load (column 4 lines 26-57 teaches that the pressure sensors are used to create an optimal set point of performance for the system.).

Re Claim 13. The refrigerating apparatus of claim 11, wherein:

the control means is configured to increase the power consumption of the pump mechanism to thereby preferentially increase the power consumption of the cooling fluid circuit (column 4 lines 33-47 teaches that the speed of the compressor can be changed to improve performance).

Re Claim 14. The refrigerating apparatus of claim 13, wherein:

the cooling fluid circuit is a supercool refrigerant circuit which includes a supercool compressor as a pump mechanism and a heat source side heat exchanger and through which supercool refrigerant as cooling fluid is circulated to effect a vapor compression refrigeration cycle (column 3 lines 1-5, 29-47), and

the control means is configured to increase the operating frequency of the supercool compressor to thereby increase the power consumption of the supercool compressor (column 4 lines 33-47 teaches that the speed of the compressor can be changed to improve performance).

Re Claim 21. The refrigerating apparatus of claim 12, wherein:

the cooling fluid circuit is a supercool refrigerant circuit which includes a supercool compressor as a pump mechanism and a heat source side heat exchanger and through which supercool refrigerant as cooling fluid is circulated to effect a vapor compression refrigeration cycle (column 3 lines 1-5, 29-47), and

the ambient condition of the supercool heat exchanger is the high pressure of supercool refrigerant in the supercool refrigerant circuit (column 4 lines 26-32).

Re Claim 22. The refrigerating apparatus of claim 12, wherein:

the cooling fluid circuit is a supercool refrigerant circuit which includes a supercool compressor as a pump mechanism and a heat source side heat exchanger and through which supercool refrigerant as cooling fluid is circulated to effect a vapor compression refrigeration cycle (column 3 lines 1-5, 29-47), and

the supercool heat exchanger is the pressure difference between the high pressure and the low pressure of supercool refrigerant in the supercool refrigerant circuit (column 4 lines 26-32).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 4-8, 15-20, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard (US6557361B1) in view of Kates (US 7114343B2).

The teachings of Howard have been discussed above.

Re Claim 4. Howard fails to teach the control means is configured to reduce the power consumption of the supercool compressor by increasing the operating frequency of a fan of the heat source side heat exchanger either based on the state of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger or based on the state of supercool refrigerant of the supercool refrigerant circuit and the temperature of outside air.

Kates teaches that a controller to control the speed of a fan in a refrigeration cycle to increase efficiency (column 5 lines 42-43).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a fan control because by adding the fan control it improves the efficiency of the system and therefore would be optimal to include in a refrigeration system to lower costs.

Re Claim 5. Howard fails to teach the state of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger is the degree of supercooling of refrigerant of the refrigerant circuit in the supercool heat exchanger.

Kates teaches measuring the degree of superheat flowing through a circuit (column 20 lines 52-59).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining superheat because it allows for accurate measurement of the performance of the refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the superheat.

Re Claim 6. Howard fails to teach the state of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger is the flow rate of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger.

Kates teaches measuring the flow rate of refrigerant (ref 1031 and ref 1030, column 19 lines 29-39).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining flow rate because it allows for accurate measurement of the performance of the refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the flow rate of refrigerant.

Re Claim 7. Howard fails to teach the state of cooling fluid of the cooling fluid circuit is the difference between temperatures of cooling fluid prior to and after supercooling of refrigerant of the refrigerant circuit in the supercool heat exchanger.

Kates teaches measuring and determining the difference between the temperatures of cooling fluid prior to and after supercooling of refrigerant (column 20 lines 60-67 teaches calculating the subcooling temperature difference).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining supercooling temperature difference because it allows for accurate measurement

of the performance of the refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the degree of supercooling.

Re Claim 8. Howard fails to teach the state of cooling fluid of the cooling fluid circuit is the flow rate of cooling fluid flowing through the supercool heat exchanger.

Kates teaches measuring the flow rate of refrigerant (ref 1031 and ref 1030, column 19 lines 29-39).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining flow rate because it allows for accurate measurement of the performance of the refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the flow rate of refrigerant.

Re Claim 15. Howard fails to teach the control means is configured to increase the operating frequency of a fan of the heat source side heat exchanger to thereby preferentially increase the power consumption of the supercool refrigerant circuit.

Kates teaches that a controller to control the speed of a fan in a refrigeration cycle to increase efficiency (column 5 lines 42-43).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a fan

control because by adding the fan control it improves the efficiency of the system and therefore would be optimal to include in a refrigeration system to lower costs.

Re Claim 16. Howard fails to teach the ambient condition of the supercool heat exchanger is the temperature of outside air.

Kates teaches a temperature sensor (ref 1028) configured to measure ambient temperature (column 19 lines 40-42).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard an ambient temperature sensor because by adding the ambient temperature sensor the controller can accurately determine the performance of the refrigeration system. This is beneficial when optimizing a refrigeration system).

Re Claim 17. Howard fails to teach the ambient condition of the supercool heat exchanger is the degree of supercooling of refrigerant of the refrigerant circuit in the supercool heat exchanger.

Kates teaches measuring the degree of superheat flowing through a circuit (column 20 lines 52-59).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining superheat because it allows for accurate measurement of the performance of the

refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the superheat.

Re Claim 18. Howard fails to teach the ambient condition of the supercool heat exchanger is the flow rate of refrigerant of the refrigerant circuit flowing through the supercool heat exchanger.

Kates teaches measuring the flow rate of refrigerant (ref 1031 and ref 1030, column 19 lines 29-39).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining flow rate because it allows for accurate measurement of the performance of the refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the flow rate of refrigerant.

Re Claim 19. Howard fails to teach the ambient condition of the supercool heat exchanger is the difference between temperatures of cooling fluid of the cooling fluid circuit prior to and after supercooling of refrigerant of the refrigerant circuit in the supercool heat exchanger.

Kates teaches measuring and determining the difference between the temperatures of cooling fluid prior to and after supercooling of refrigerant (column 20 lines 60-67 teaches calculating the subcooling temperature difference).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining supercooling temperature difference because it allows for accurate measurement of the performance of the refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the degree of supercooling.

Re Claim 20. Howard fails to teach the ambient condition of the supercool heat exchanger is the flow rate of cooling fluid of the cooling fluid circuit flowing through the supercool heat exchanger.

Kates teaches measuring the flow rate of refrigerant (ref 1031 and ref 1030, column 19 lines 29-39).

In view of Kate's teachings, it would have been obvious to one of ordinary skill at the time of invention to include with the subcooling refrigeration cycle as taught by Howard a step of determining flow rate because it allows for accurate measurement of the performance of the refrigeration circuit. Since Howard already teaches a controller in the refrigeration circuit, it would have been obvious to add another sensor to measure and calculate the flow rate of refrigerant.

Re Claim 23. Howard teaches that the control means is configured to decrease the target value as the temperature of outside air increases (column 4 lines 49-57 teaches the procedure of using a temperature as a set point. Column 4 lines 38-44 teach that the set points are calculated

for optimal performance. It can therefore be appreciated that the reference teaches changing the target value based on a temperature measurement).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Martin (US 6708511B2) teaches a cooling device with water subcooling system. Chen et al (US 2005/0132735A1) teaches transcritical vapor compression optimization. Fujimoto et al (US6449969B1) teaches a method for controlling coolant circulation system.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRAVIS RUBY whose telephone number is (571)270-5760. The examiner can normally be reached on Monday-Thursday 7:30-5:00, Friday 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frantz Jules can be reached on 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Travis Ruby/
Examiner, Art Unit 3744

2/10/2009

/Frantz F. Jules/
Supervisory Patent Examiner, Art Unit 3744